Groupe Model-fitting

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Guillaume Mella "GUI Master", Hervé Beust *IPAG*

&

Gilles Duvert, Laurent Bourgès, Sylvain Lafrasse *IPAG*
"beta-testeurs" : Paul Berlioz-Athaud *CRAL,* JB LeBouquin *IPAG*
A. Domiciano de Souza, N. Nardetto, M. Vannier *OCA*

Outline

1. Chantiers actuels
   - implantation de différents fitters
   - implantation des "Users Functions"

2. Chantier à plannifier
   - prise en compte du nouveau format des données OIFITS2

3. Formation / Communication
   - Formation via écoles VLTI
   - Communication via ateliers, meetings et publications

Chantiers en cours
Fitters

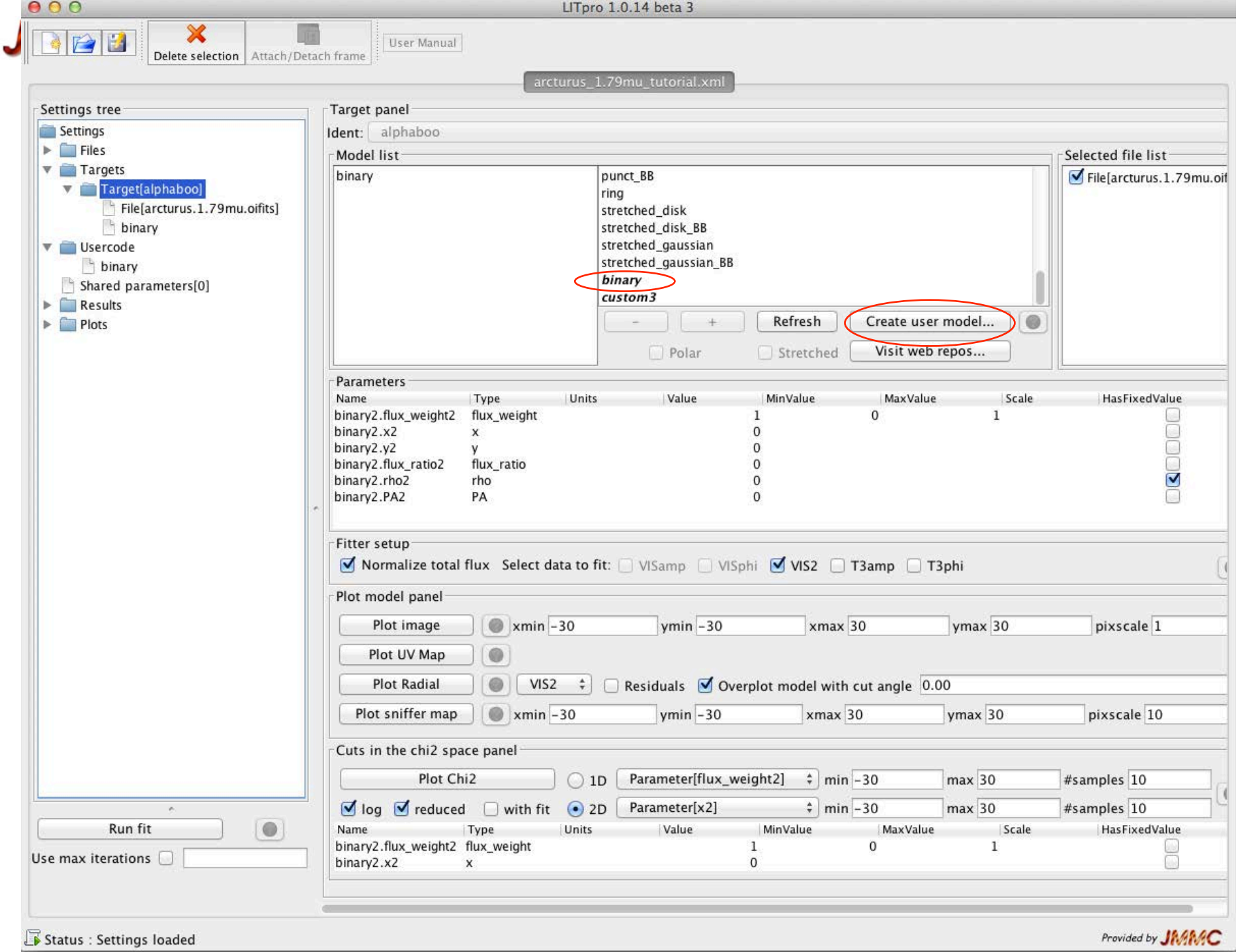
- disposer de différents moteurs d'ajustement
  - actuellement : Levenberg-Marquardt avec trust region, bornes et barres d'erreur
  - algo. génétique (codé par Hervé)
  - autres essayés : Nelder-Mead, LM plus rapide (en test)
  - nouvel interfaçage à tester
  - estimation séparée des barres d'erreur (avec LM)

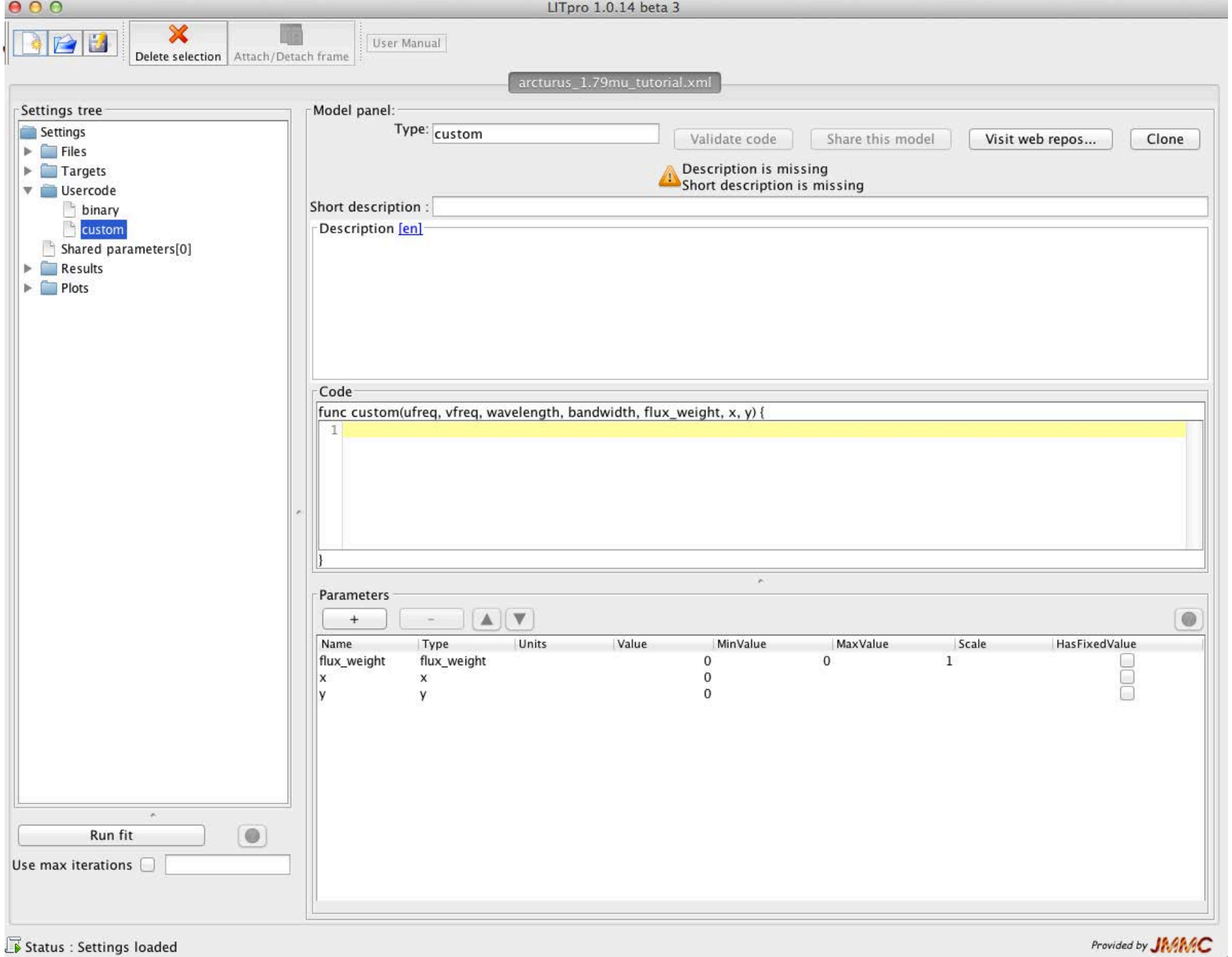
- séance de travail Hervé & Michel du 5 au 7 janvier 2016

- plus tard : inclure le resampling pour le calcul des barres d'erreur

Chantiers en cours
Users functions

- permettre à l'utilisateur d'écrire et ajuster sa propre fonction
  - fonction "custom" dans GUI
  - page Web interactive de **partage des modèles**
    - aide disponible, avec accès au code des fonctions utilisateurs existantes
      (en Yorick - *http://sourceforge.net/projects/yorick/*).
    - → enrichissement par tous de la bibliothèque de modèles


LITpro 1.0.14 beta 3
Delete selection
Attach/Detach frame
User Manual
arcturus_1.79mu_tutorial.xml
Settings tree
Settings
Files
Targets
Target[alphaboo]
File[arcturus.1.79mu.oifits]
binary
Usercode
binary
Shared parameters[0]
Results
Plots
Target panel
Ident: alphaboo
Model list
binary
punct_BB
ring
stretched_disk
stretched_disk_BB
stretched_gaussian
stretched_gaussian_BB
binary
custom3
Refresh
Create user model...
Polar
Stretched
Visit web repos...
Selected file list
File[arcturus.1.79mu.oif
Parameters
Name Type Units Value MinValue MaxValue Scale HasFixedValue
binary2.flux_weight2 flux_weight 1 0 1
binary2.x2 x 0
binary2.y2 y 0
binary2.flux_ratio2 flux_ratio 0
binary2.rho2 rho 0
binary2.PA2 PA 0
Fitter setup
Normalize total flux
Select data to fit:
VISamp
VISphi
VIS2
T3amp
T3phi
Plot model panel
Plot image
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 1
Plot UV Map
Plot Radial
VIS2
Residuals
Overplot model with cut angle 0.00
Plot sniffer map
xmin -30 ymin -30 xmax 30 ymax 30 pixscale 10
Cuts in the chi2 space panel
Plot Chi2
1D
Parameter[flux_weight2]
min -30 max 30 #samples 10
log
reduced
with fit
2D
Parameter[x2]
min -30 max 30 #samples 10
Name Type Units Value MinValue MaxValue Scale HasFixedValue
binary2.flux_weight2 flux_weight 1 0 1
binary2.x2 x 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC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Delete selection
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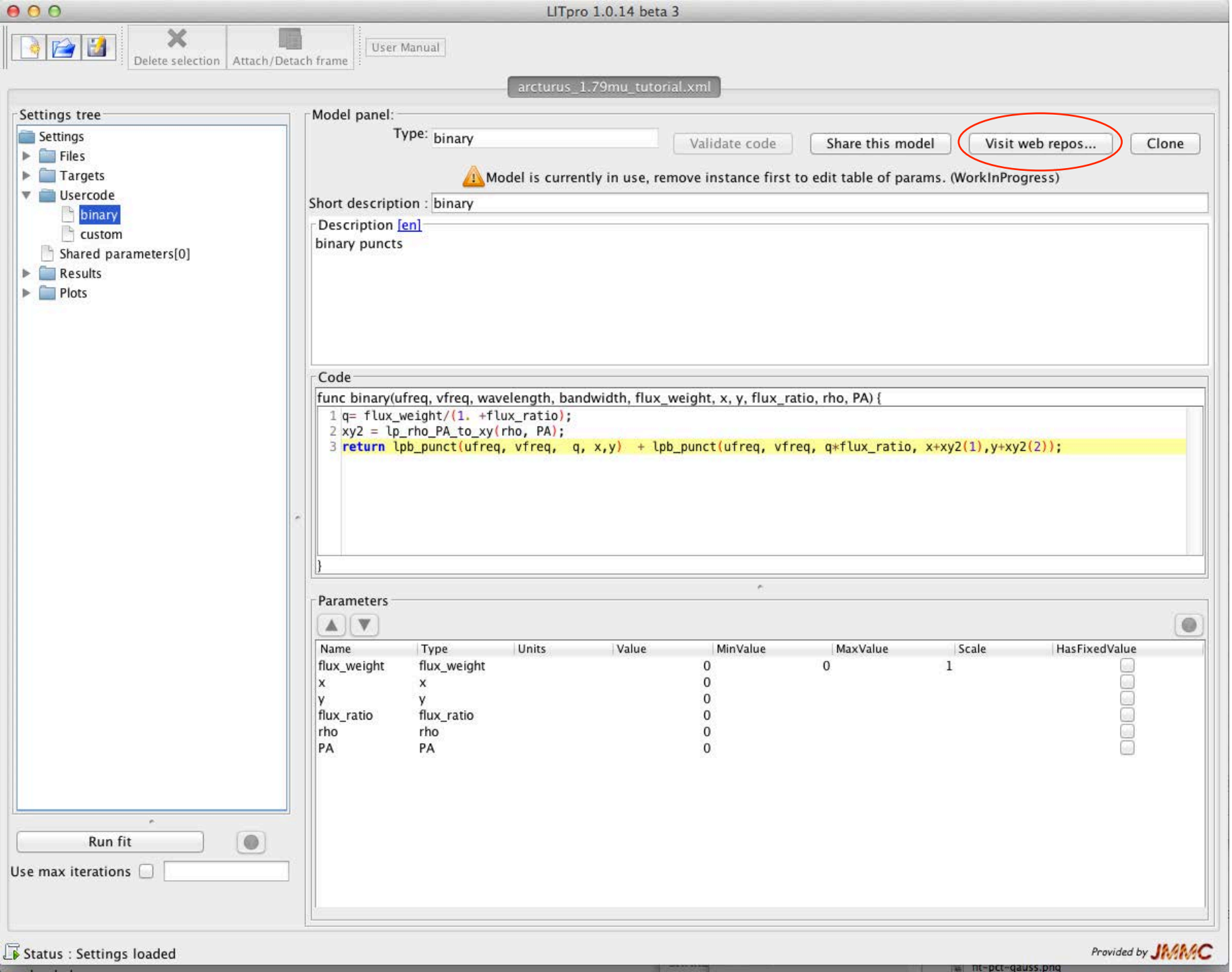
User Manual
arcturus_1.79mu_tutorial.xml
Settings tree
Settings
Files
Targets
Usercode
binary
custom
Shared parameters[0]
Results
Plots
Model panel:
Type: custom
Validate code
Share this model
Visit web repos...
Clone
Description is missing
Short description is missing
Short description :
Description [en]
Code
func custom(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y) {
1
}
Parameters
+
-
Name Type Units Value MinValue MaxValue Scale HasFixedValue
flux_weight flux_weight 0 0 1
x x 0
y y 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC


LITpro 1.0.14 beta 3
Delete selection
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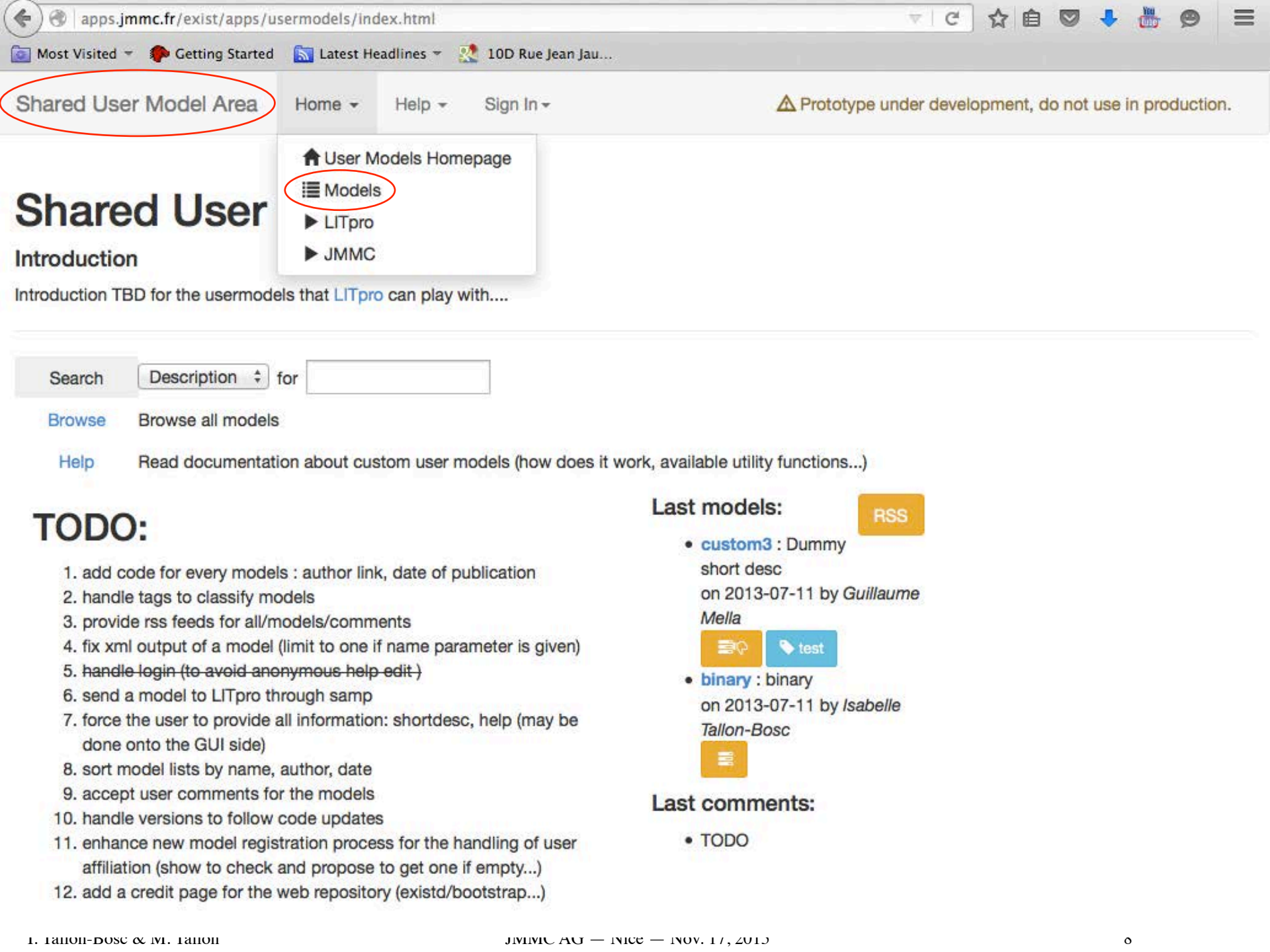
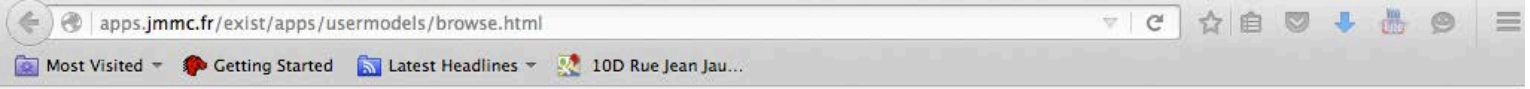
User Manual
arcturus_1.79mu_tutorial.xml
Settings tree
Settings
Files
Targets
Usercode
binary
custom
Shared parameters[0]
Results
Plots
Model panel:
Type: binary
Validate code
Share this model
Visit web repos...
Clone
Model is currently in use, remove instance first to edit table of params. (WorkInProgress)
Short description : binary
Description [en]
binary puncts
Code
func binary(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y, flux_ratio, rho, PA) {
1 q= flux_weight/(1. +flux_ratio);
2 xy2 = lp_rho_PA_to_xy(rho, PA);
3 return lpb_punct(ufreq, vfreq, q, x,y) + lpb_punct(ufreq, vfreq, q*flux_ratio, x+xy2(1),y+xy2(2));
}
Parameters
Name Type Units Value MinValue MaxValue Scale HasFixedValue
flux_weight flux_weight 0 0 1
x x 0
y y 0
flux_ratio flux_ratio 0
rho rho 0
PA PA 0
Run fit
Use max iterations
Status : Settings loaded
Provided by JMMC


apps.jmmc.fr/exist/apps/usermodels/index.html
Most Visited
Getting Started
Latest Headlines
10D Rue Jean Jau...
Shared User Model Area
Home
Help
Sign In
Prototype under development, do not use in production.
User Models Homepage
Models
LITpro
JMMC
Shared User
Introduction
Introduction TBD for the usermodels that LITpro can play with....
Search
Description
for
Browse
Browse all models
Help
Read documentation about custom user models (how does it work, available utility functions...)
TODO:
1. add code for every models : author link, date of publication
2. handle tags to classify models
3. provide rss feeds for all/models/comments
4. fix xml output of a model (limit to one if name parameter is given)
5. handle login (to avoid anonymous help edit)
6. send a model to LITpro through samp
7. force the user to provide all information: shortdesc, help (may be done onto the GUI side)
8. sort model lists by name, author, date
9. accept user comments for the models
10. handle versions to follow code updates
11. enhance new model registration process for the handling of user affiliation (show to check and propose to get one if empty...)
12. add a credit page for the web repository (existd/bootstrap...)
Last models:
RSS
custom3 : Dummy
short desc
on 2013-07-11 by Guillaume Mella
test
binary : binary
on 2013-07-11 by Isabelle Tallon-Bosc
Last comments:
TODO



Shared User Model Area Home Help Sign In ⚠ Prototype under development, do not use in production.

Browse model list

new validated LITpro test Filter

Model name and short description	Author
LITpro **background** Background	Isabelle Tallon-Bosc *CRAL*
binary binary	Isabelle Tallon-Bosc *CRAL*
LITpro **circle** Circle	Isabelle Tallon-Bosc *CRAL*
test **custom3** Dummy short desc	Guillaume Mella *JMMC / IPAG / OSUG*
LITpro **disk** Uniform disk with normalized total flux	Isabelle Tallon-Bosc *CRAL*
LITpro **gaussian** *code TBD* Gaussian	Isabelle Tallon-Bosc *CRAL*
LITpro **limb_linear** *code TBD* Limb-darkened disk with linear law	Isabelle Tallon-Bosc *CRAL*
LITpro **limb_nonlinear_Claret** *code TBD* Limb-darkened disk with the new non-linear law of Claret (2000)	Isabelle Tallon-Bosc *CRAL*
LITpro **limb_power** *code TBD* Limb-darkened disk with power law	Isabelle Tallon-Bosc *CRAL*
LITpro **limb_quadratic** *code TBD* Limb-darkened disk with quadratic law	Isabelle Tallon-Bosc *CRAL*
LITpro **limb_sqrt** *code TBD* Limb-darkened disk with square root law	Isabelle Tallon-Bosc *CRAL*

binary model

Short description

binary

Description

```
binary puncts
```

Code

```
binary(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y, flux_ratio, rho, PA) {
q= flux_weight/(1. +flux_ratio);
xy2 = lp_rho_PA_to_xy(rho, PA);
return lpb_punct(ufreq, vfreq,  q, x,y)  + lpb_punct(ufreq, vfreq, q*flux_ratio, x+xy2(1),y+xy2(2));
}
```

Comments

Please login to enter comments

Model Info

Submitted: 2013-07-11
Version: 1
Author: Isabelle Tallon-Bosc (*CRAL*)
Tags:
Status:
Comments:0
UID: d7f8a169-7fa8-4600-b9fc-bd93abc561eb

disk model

Short description

Uniform disk with normalized total flux

Description

```
/* DOCUMENT  tf= lpb_disk(ufreq, vfreq, flux_weight, x, y, diameter)

    Returns the Fourier transform, computed at spatial frequencies
    (UFREQ,VFREQ) given in 1/rad, of a normalized uniform disk of diameter
    DIAMETER (milliarcsecond) and centered at coordinates (X,Y)
    (milliarcsecond).

    FLUX_WEIGHT is the intensity coefficient. FLUX_WEIGHT=1 means total
    energy is 1. For a fixed value of FLUX_WEIGHT, the amplitude of this
    disk function depends on the diameter. See lpb_nonorm_disk to use the
    amplitude as a parameter.

    The function returns an error if DIAMETER is negative, so it is advised
    to set a VMIN bound to zero or more on this parameter.

    UFREQ and VFREQ must be conformable. The returned array is always
    complex and with dimensions dimsof(UFREQ,VFREQ).

SEE ALSO: lpb_functions
*/
```

Code

```
disk(ufreq, vfreq, wavelength, bandwidth, flux_weight, x, y, diameter) {
 extern _LPB_PI, _LPB_MAS2RAD, _LPB_DBL_MIN;

  // Adding _LPB_DBL_MIN is a turn around for the singularity at r=0.
  // r is numerically unchanged where r > 2.00417e-292
  r = (_LPB_MAS2RAD *_LPB_PI*0.5*diameter) * abs(ufreq, vfreq) + _LPB_DBL_MIN;
  return bessj1(2.*r)/r;

}
```

Comments

Please login to enter comments

Model Info

Submitted: 2006-06-14
Version:
Author: Isabelle Tallon-Bosc (*CRAL*)
Tags: LITpro
Status:
Comments:0
UID:

Chantiers en cours
Users functions

- permettre à l'utilisateur d'écrire sa propre fonction
  - fonction "custom" dans GUI
  - page Web interactive "Shared User Model Area"
    - aide accessible
    - code des fonctions utilisateurs existantes
    - enrichissement par tous de la bibliothèque de modèles

- séance de travail de Guillaume, Michel et Isa, du 2 au 4 février 2016

- tests par Hervé (avec fonction orbite) et les autres personnes du groupe

Nouveau format OIFITS 2
à supporter

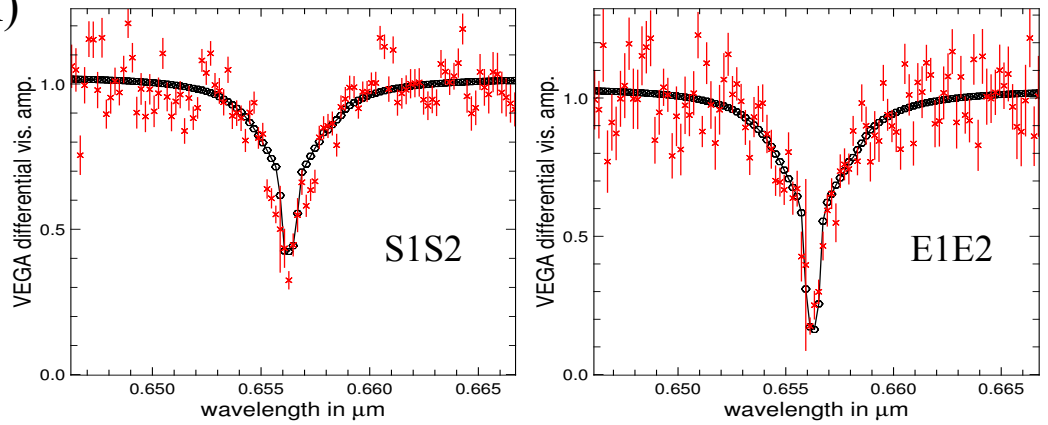
- LITpro fitte déjà SED et visibilités simultanément
  (cf. papier de référence SPIE 2008)

➔ pas de difficulté a priori avec la nouvelle table OI_SPECTRUM

- nouveau format ➔ instrument identifié

  → origine des visibilités différentielles identifiée (keyword de OI_VIS), avec méthode de mesures

➔ adaptation du modèle des mesures par LITpro
(proto. réalisé au sein de POLCA)



Formation / Communication

– Ecoles VLTI

(Goutelas, Porquerolles, Barcelonnette,Valpareiso, Cologne)

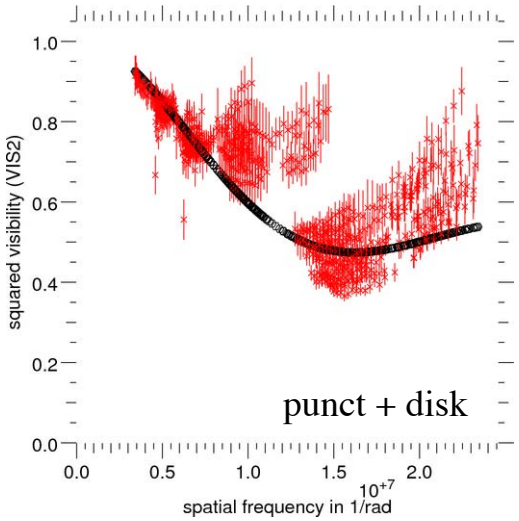
cours et séance pratique

→ améliorations à chaque édition, compte tenu des retours des participants et de l'évolution du soft

(développement d'un point du cours, ajout d'exercices d'ajustement,...)

ex. en 2015 : fit chromatique avec introduction de corps noirs

Exercise 6

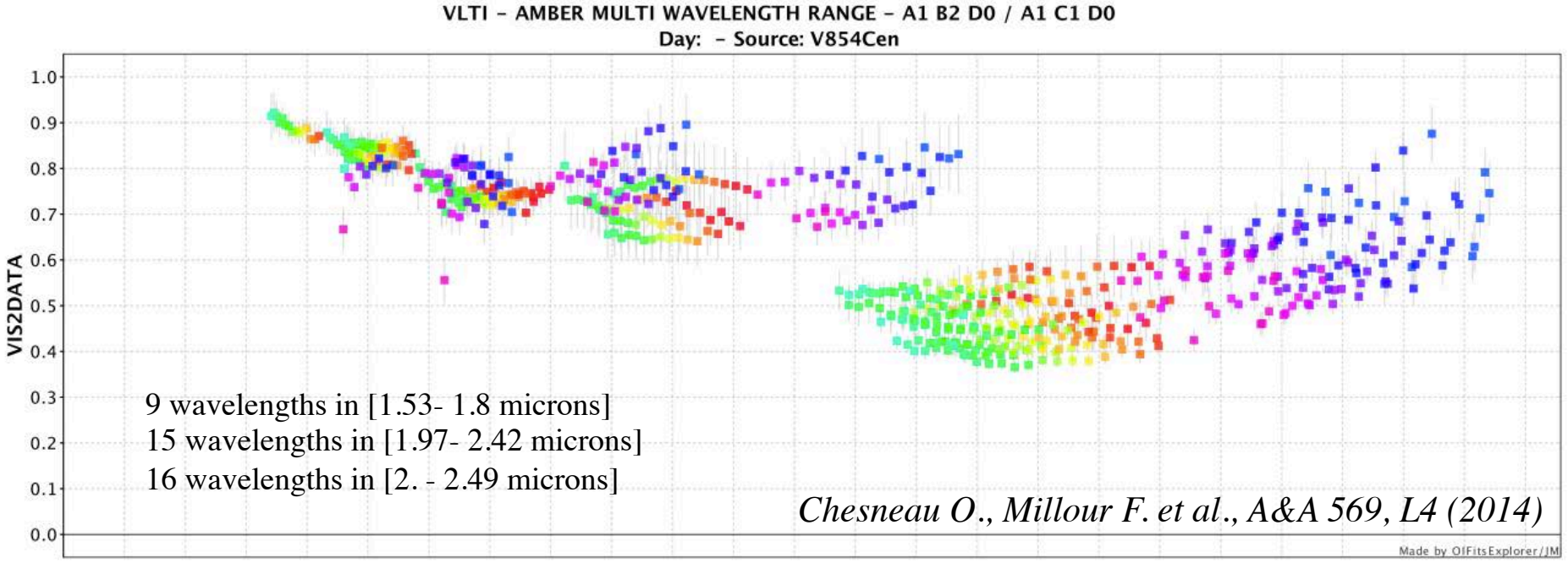


punct + disk

VLTI-school
Cologne
Septembre 2015

sur données AMBER V854Cen

Such achromatic models seem to follow a mean behaviour of the data versus the spatial frequencies
but cannot fit the "commas". Those are due to the chromatism of the data, seen using OIFits Explorer (for the moment)

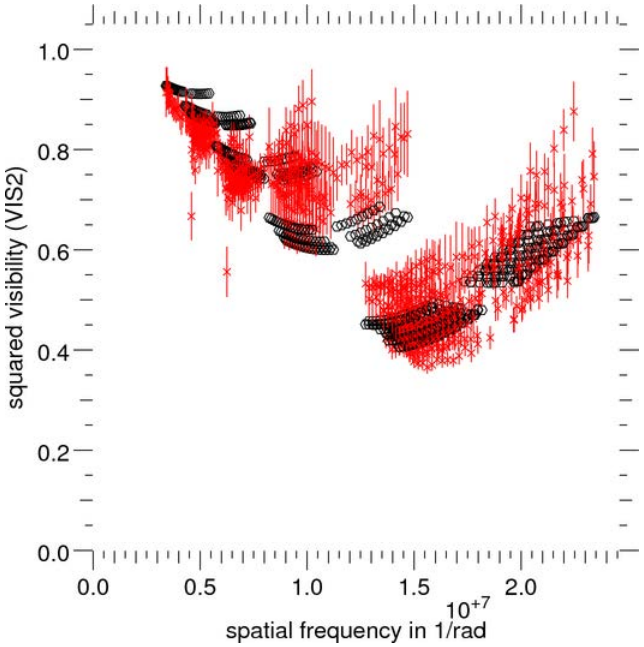


Use of models weighted by a black body

for example :

centered punct_BB (T=6750 fixed) + disk_BB

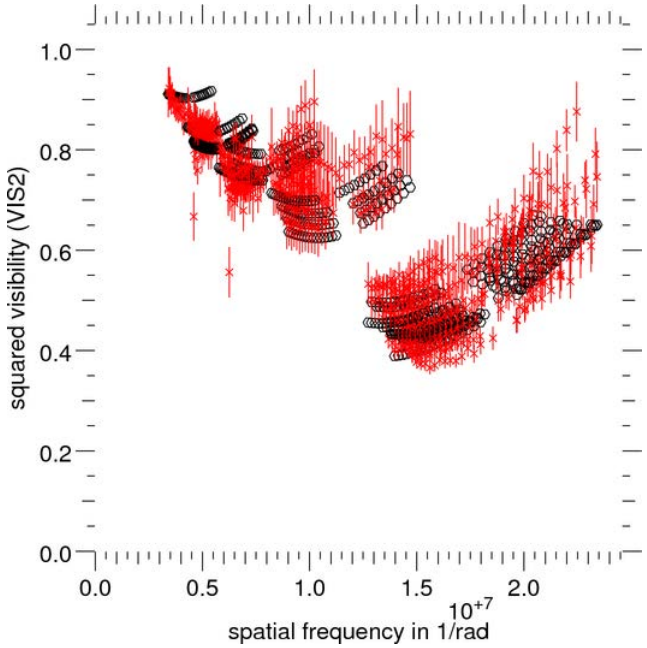
reduced Chi2 final= 2.943 - sigma= 0.048
diameter2 = 18.203 +/- 0.222 mas
flux_weight1 = 376.63 +/- 21.8
flux_weight2 = 21.437 +/- 1.26
temperature2 = 2154.8 +/- 46.5 Kelvin



centered punct_BB (T_1=6750 fixed) + stretched gaussian_BB

reduced Chi2 final= **2.128** - sigma= 0.048
fwhm2 = **10.814 +/- 0.192 mas**
flux_weight1 = 325.89 +/- 16.4
flux_weight2 = 31.273 +/- 1.86
stretch_pos_angle2 = **35.785 +/- 1.16** degree
stretch_ratio2 **= 0.72009 +/- 0.0119**
temperature2 = **1606.2 +/- 35.6** Kelvin

similar to published results



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ex. en 2015 : fit chromatique avec introduction de corps noirs

– Communication

- via ateliers et meetings (ex. meeting CHARA, SPIE, ...)
- publications ...

A POURSUIVRE